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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/492,749	01/27/2000	Christian Francois Michel Dujarric	Q57649	1328

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EXAMINER

GARTENBERG, EHUD

ART UNIT	PAPER NUMBER
3746	23

DATE MAILED: 02/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/492,749

Applicant(s)

DUJARRIC, CHRISTIAN
FRANCOIS MICHEL

Examiner

Ehud Gartenberg

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on papers filed through 12/16/2002.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 4-8 and 14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 4-8 and 14 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 22_19.
- 4) Interview Summary (PTO-413) Paper No(s) _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 4-8 and 14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter that is against public policy. The United States National Space Policy states *inter alia*, that "Space nuclear reactors will not be used in Earth orbit without specific approval by the President", see in The White House, National Science and Technology Council, Fact Sheet National Space Policy, 9/19/1996, Intersector Guidelines, (6) Space Nuclear Power. There is no indication on the record that such an approval was, or will be granted by the President or his designee to practice the present invention. In response to Applicant's argument filed 12/16/2002, it is noted that as of February 12, 2003, this policy has not been changed.

3. In response to Applicant's arguments filed 12/16/2003 that the Presidential approval is required only for Earth-orbiting nuclear reactors, and not for nuclear reactors used in escape trajectories, it is noted that in any space launch, earth orbit may occur as a result of malfunction during the ascending phase causing the vehicle not to reach escape velocity. Therefore any vehicle launched into space is liable to become Earth orbiting.

4. In further response to said arguments, the Examiner will not comment on the following issues, because they are beyond the scope of patent application prosecution and examination:

a) the prosecution history of any United States Patent; b) research and development performed anywhere in the world; c) international cooperation treaties.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 4-8, 14 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The nuclear core 18 and heat engine 19 of Fig. 1 are not enabled and they are essential to the practice of the invention, because they power and rotate all the propellant pumps 10, 14, 16 and electricity generator 11 which feeds the critical induction loop 4. Note that the Borowski article in Aerospace America of 7/1992 does not enable said nuclear-core/engine combination either, in spite of claim to the contrary in the present application on p. 12, II. 25-32 and in the response filed December 10, 2001. Note that: 1) the prohibitive weight of nuclear power reactors and the associated safety devices makes them at this time unsuitable for flight applications.

2) In no specific place does Borowski refer to a known nuclear reactor that has ever been flown on a rocket, or tested in a simulated rocket environment as a flight-qualified hardware (see also Applicant's own admission on p. 7, I. 20 *et seq.*) The Borowski

article is speculative in substance and cannot be relied upon as enabling the claimed propulsion device whose most critical component is the nuclear reactor.

The disclosure is also not enabling 1) how to make a Brayton cycle with a pressure ratio of 82.2 (p. 15, l. 15), and 2) the factor 0.2 on p. 17, l. 15 (denominator of the formula). Note that enabling of the invention does not refer to substituting speculative numbers in a formula, but actually teaching the apparatus that can produce and withstand said pressure and a temperature of 2000 K conditions in a flight environment using Helium. While in conventional jet engines the air may be heated to 2000 K in the combustor by combusting kerosene, in the present case the Helium, being a noble element, can be heated only by heat transfer, as Helium cannot combine and burn with any other substance. The present application does not enable a light, flight capable heat exchanger operating at temperatures higher than 2000K and at high pressure. The argument on p. 8, ll. 5-7 of the amendment filed 6/17/2002 that the Space Shuttle turbo-pumps deliver hydrogen at 426 bars is not relevant because said pumps are not part of a Brayton cycle, as in the present invention. Regarding the factor 0.2, the disclosure does not teach how this number was deduced or measured, or how the entire combination was made according to this number, and therefore this figure is also considered to be speculative. "Speculative" is used here in the sense of hypothetical figures of merit used routinely in engineering feasibility studies. The fact that certain critical values are assumed (or speculated) to be feasible does not necessarily make these values actually feasible or attainable in the real world. This rejection is maintained in light of the amendment filed 6/17/2002, and answer filed 12/16/2002, because there

is nothing substantial in the accompanying explanations to actually enable how to make an engine having those attributes, for example the weight of the engine components and its accessories. The Examiner strongly disagrees with the statement on p. 6, ll. 6-7 that "the manner in which heat is generated is not material to the operation of the heat engine". In rocket propulsion in general, and in space application in particular, the manner in which heat is generated and dissipated is THE MOST IMPORTANT ASPECT to the operation of the heat engine.

In response to the amendment filed 6/17/2002, note the following: neither the Applicant nor his cited references actually teach how to make the nuclear reactor and the associated heat exchanger of the claimed propulsion device. On p. 4, ll. 15-17 of the amendment, Applicant specifically states that his reactor is significantly different from the NERVA technology. Therefore, the facts at this point are as follows: the NERVA program never produced a flight able engine (see Sutton and Ross, "Rocket Propulsion Elements" (1976), p. 519, l. 1.) Therefore, the figures of merit quoted in both Sutton and Ross and in Cinnamon are at this point in time speculative. Applicant is arguing that his reactor (that is not enabled by the current disclosure anyway) has the same figures of merit (e.g., thrust-to-weight ratio) as the NERVA engine. Therefore, it can be logically deduced that the quoted figures of merit of the present non-enabled engine are a first speculation in a chain of dependent speculations, that are further derived from speculative figures of merit of the non-existing NERVA-derived engine (the second speculation in the chain of speculations), that furthermore is "quite different" from the one in the present invention (the third speculation in the chain of speculations). **In order**

to overcome this rejection, Applicant is suggested to indicate in very precise terms and locations the enablement of the making and use of the engine and the associated heat transfer equipment that rotates the high frequency electricity generator and pumps claimed in claim 14.

In response to Applicant's arguments filed 12/16/2002, p. 9, ll. 15-16, the Examiner notes that nowhere in the disclosure there is an enabling teaching on how to make and use a particle bed reactor as part of a propulsion system that has a core temperature of 3000K and delivers 0.5MW per kilogram mass of weight. Also, the repeated reliance of the Applicant on the Cinnamon reference is not considered as enabling, because Cinnamon himself is not enabling and he lacks the specific teachings on how to make and use the NERVA project in an actual propulsion system environment. If the Applicant has enabling teachings on this matter, he should make them of record.

Specification

7. The disclosure is objected to because of the following informalities: the teaching on p. 9, ll. 25-26 of frequencies upwards of 10kHz does not agree with the teaching on p. 13, l. 30, of a frequency of 30,000 rpm, i.e., 500Hz. The explanation given on p. 8, ll. 1-10 of the response filed 12/10/2001 does not clarify the number of poles that Applicants intend to use in order to produce an alternating current of 60,000Hz from a rotor rotating at 500Hz. If an unusually large number of poles will be claimed, then the question will arise whether or not the circumference of the alternator can physically accommodate that many poles in the confined space available, which is an enablement

issue. Note that the teaching on p. 13, ll. 30 *et seq.*, and in the response filed on 12/10/2001 on p. 8 first paragraph is not accurate because 60,000Hz are not of the same order of magnitude with 500Hz. The explanation given in the amendment filed 6/17/2002, that the numbers quoted are given by way of a possible embodiment still does not teach how to make and use the invention. Incidentally, how precisely the Applicant intends to produce an alternating current at 60,000Hz from a rotor rotating at 500Hz (a multiplier of 120!) still remains a mystery. This objection is maintained, because the amendment and explanations given in the response filed 12/16/2002 are not convincing, and not enabling either.

8. The condition of the disclosure precludes a complete examination for lack of enablement, but to the extent that the invention can be understood, a search of prior art has been conducted and the following rejections have been made. Lack of rejection over the prior art should not be interpreted as allowable subject matter.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 14 is rejected under 35 U.S.C. 102(b) as being anticipated by Curtiss et al., 3,173,248 which teach the invention substantially as disclosed and as claimed: a

propulsion device 10 having an injection chamber 22, a nozzle between said chamber and a diverging section (unnumbered), an inductive coil 12 connected to a high-frequency electricity generator 24-26, and a divergent section (unnumbered) downstream the loop. Note that the alternating current in coil 12 inherently heats the ejected gases, as disclosed and as claimed, the Curtiss apparatus necessitating cooling to keep the temperature of the structure within the permissible limits.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curtiss as applied to claim 14 above, and further in view of Oberly 4,739,200, which teaches to generate high-voltage high-power electricity for aerospace applications (col. 1, II. 48-50, and col. 2, II. 46) by cooling (i.e., heat exchanging) the generator with liquid hydrogen (col. 1, I. 58 and col. 3, II. 3-9). It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to cool the Curtiss generator with a propellant fluid as taught by Oberly, in order produce high-voltage high-power electricity with minimum weight as taught by Oberly. Note that liquid hydrogen was conventionally used in LH₂/LOX rocket engines at the time of the claimed invention (Oberly, Fig. 8, 40

and 52), and therefore the Oberly engine had two separate inlets, one for LH₂ and the other for LOX.

Applicant's objection to the use of Oberly '200 as being non-analogous art is not convincing in light of Oberly's specific teaching to the contrary, i.e., Oberly's invention specifically being disclosed as applicable for aerospace applications on col. 2, l. 46.

Applicant is reminded that lack of rejection over the prior art should not be interpreted as allowable subject matter, in view of the rejection under 35USC112, 1st paragraph.

13. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curtiss in view of Oberly as applied to claim 5 above, and further in view of Applicant's own admission that at the time of the claimed invention it was known in the art to use nuclear cores for space propulsion applications, such as the NERVA program. It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use a nuclear core in the Curtiss propulsion system and use said core for the electrical power generation, in order to extend the system's useful life. Note that pumps were conventionally used in the art at the time of the claimed invention to inject propellants, and that heat exchangers were also conventionally used in order to increasing the thermal efficiency of the propulsion apparatus and to keep the temperature of the walls within the permissible operational range.

Response to Arguments

14. Applicant's arguments filed 6/17/2002 and 12/16/2002 have been fully considered but they are not persuasive for reasons discussed in detail above.
15. In particular, it cannot be emphasized enough that the disclosure as a whole, examined in light of all the references of record, that many of them are speculative in nature in the sense that the authors do not produce concrete, actual, real-life evidence to support their assertions, is not enabling one of ordinary skill in the art how to make and use the invention.

Conclusion

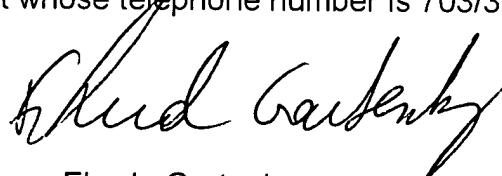
1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ehud Gartenberg whose telephone number is 703/308-2634. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S Thorpe can be reached on 703/308-0102. The fax phone numbers for the organization where this application or proceeding is assigned are 703/872-9302 for regular communications and 703/872-9303 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703/308-0861.



Ehud Gartenberg
Primary Examiner
Art Unit 3746

February 14, 2003

**EHUD GARTENBERG
PRIMARY EXAMINER**